REMARKS

A response to the Final Office Action was filed within two months of having received the Final Office Action. However, no Advisory Action was received. This has necessitated an expensive petition for three months of extension. The USPTO is requested to credit this cost to Deposit Account 19-2179.

In the Office Action, the Examiner again rejected claims 1-4, 6-8, 11-13, and 15-23 pursuant to 35 U.S.C. § 103(a) as being unpatentable over Wright, et al. (U.S. Patent No. 6,016,285) in view of Bunce (U.S. Patent No. 6,371,918). Claims 5 and 9 were again rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Wright, et al. in view of Bunce, and further in view of Breimesser, et al. (U.S. Patent No. 5,622,177). Claims 10 and 14 were again rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Wright, et al. in view of Bunce and in further view of Bamber (U.S. Patent No. 5,538,004). Claim 25 was again rejected over Wright, et al. in view of Bunce, and further in view of official notice.

Applicants respectfully request reconsideration of the rejections of claims 1-24, including independent claims 1, 11, 16 and 20. *New arguments are added in italics below.*

Independent claim 1 recites an analog-to-digital converter between the transducer and the releaseable connector. Wright, et al. and Bunce do not disclose this limitation.

Wright, et al. show a receive beamformer with analog-to-digital converters (Fig. 4A; and col. 22, lines 5-13). However, the beamformer is part of the ultrasound imaging system connected at the multiplexer 4 by cables to the transducer 1 (Fig. 4A). Wright, et al. show a complicated, cart-based type system with the converters as part of the system, so do not show the analog-to-digital converter between the transducer and the connector.

Bunce describe a connector (abstract). The connector has a conduit for the cables to the transducer (col. 2, lines 30-37). A pin 22 and retaining pins 23 are used on a connector board with gold plated contacts 34 for connection to the imaging system (col. 2, lines 47-56). Figure 4 shows the pin 22. The pin is for engaging and disengaging a mating side on the console or imaging system (col. 2, lines 44-46 and 49-53). The mating connector on the

console/imaging system side is shown in Figure 5 and includes pin slots 53 and hole 54 for mating with the transducer connector (col. 2, lines 57-64). The mating/console side is described as including the circuitry (col. 1, lines 56-64). By using a circuit board connection, Bunce saves space by allowing circuits in the console/imaging side close to the connector. Bunce does not suggest circuits between the transducer and detachable connector.

A person of ordinary skill in the art would not have used the beamformer of Wright, et al. with the transducer connector of Bunce. Bunce distinguish larger, cart-based, scanning devices from more portable systems (col. 1, lines 11-22 and 36-47). The connectors for these sophisticated systems are quite reliable and maintain good signal fidelity (col. 1, lines 37-39). Wright, et al. discloses a very sophisticated beamformer system for the cart-based Acuson Sequoia System. Given Bunce's specific teaching that connectors for such systems are good, the small highly portable connector design of Bunce would not have been used with the beamformer of Wright, et al.

In response, the Examiner focuses on the obviousness of the combination, noting a reduction is complexity motivating use of Bunce in Wright, et al. However, a person would not have used the connector of Bunce with Wright, et al. Bunce teaches advantages of the connector, including size, weight, direct mounting, and reduction in complexity. However, these advantages are in light of use on a small, portable scanner. For larger scanners, the connectors of the previous implementations were "quite reliable" and maintained "good signal fidelity." Reduction of complexity would not be sought at the risk of established reliability and signal fidelity. A person of ordinary skill would not have used the connector of Bunce with the complex system of Wright, et al.

The Examiner did not deal with the additional reason for allowability, failure of each reference to disclose the claimed position of the analog-to-digital converter. As noted above, claim 1 is allowable for a different reason. Bunce and Wright, et al. both fail to disclose the analog-to-digital converter between the transducer and the connector as claimed in claim 1. Bunce provides circuits on the mating half of the system side (col. 1, lines 56-64 and col. 2, lines 49-53). Bunce terms the consul or system side of the connector as the mating half or connector (col. 2, lines 49-53). The transducer side is a connector different from the mating

side (col. 2, lines 44-46). Bunce does not provide active circuits for or an analog-to-digital converter on the transducer side of the connector.

Wright, et al. do not show a connector, but do show cables connected to circuits (Fig. 4A). Wright, et al. is silent about the connector. Wright, et al. do not show the analog-to-digital converter between the transducer and the connector.

Both references fail to teach the claimed placement of circuits, such as an analog-to-digital converter. If combined, this limitation is still missing. If combined, the teaching of Bunce to put the circuitry on the system side would have been used by a person of ordinary skill in the art.

Independent claim 11 recites a detachable transducer assembly with an analog-to-digital converter in a connector housing, which is physically detachable from a connector on the system housing. As discussed above for claim 1, Wright, et al. and Bunce position circuits on a system side, so do not suggest these limitations.

The Examiner alleges assumptions about circuit position are made by applicant. However, Bunce specifically teaches circuits on the system side, and Wright, et al. is silent. The ADC would not be in the detachable connector housing.

Also, a person of ordinary skill in the art would not have used the Wright, et al. beamformer system with the transducer connector of Bunce.

Independent claim 16 recites a processor connected between the transducer and releasable connector. As discussed above for claim 1, Wright, et al. and Bunce do not suggest circuits on the transducer side of the releasable connector.

The Examiner alleges it could have been acceptable for Wright, et al. to have the detachable connector before the phase aligner control of Figure 4B. However, there is simply no teaching or reason to do so. Bunce teaches the circuits on the system side. A person of ordinary skill would put the connector before the beamformer and ADC, not the phase aligner, due to signal fidelity. Also, one system works with many transducers. Putting circuits in the transducer, especially the ADC where the system beamformer is digital, would

have increased costs and complexity (requiring circuits in every transducer), so would not have been obvious.

As another reason for allowance, the connector of Bunce would not have been used with the beamformer of Wright, et al.

Independent claim 20 recites converting signals to digital data in the probe assembly. Claim 20 is allowable for any of the same reasons as claim 1.

Dependent claims 2-10, 12-15, 17-19 and 21-24 each depend from one of the independent claims above, so is each allowable for the same reasons as the corresponding base claim. Further limitations distinguish from the cited references.

Claim 6 recites a summer operable to output combined signals to electrical outputs of a releaseable connector. The summer of Wright, et al. is not disclosed as in the transducer assembly.

Claim 7 recites a partial beamformer outputting to the electrical outputs. Wright, et al. do not disclose the beamformer in the transducer assembly.

Claims 8 and 15 are allowable for a similar reason as claims 6 and 7.

Claim 9 recites a switch to bypass analog signals to the electrical output. Breimesser, et al. multiplex the signals. There is no suggestion of a switch to bypass.

Claims 10 and 14 recite a serializer connected with the outputs. There is no suggestion to position a serializer in the transducer assembly. The Examiner cites to all of Bomber for the serializer without any specific citation, so detailed citations are requested if this rejection is maintained.

Claim 13 recites a demultiplexer housed in the connector housing. The cited references do not suggest this placement. Claim 23 is allowable for a similar reason.

Claims 17 and 21 are allowable for the same reasons as claim 1.

Claim 19 recites partial beamforming by a processor in the connector housing. The cited references do not show partial beamforming in this location.

For claims 6-10, 13-15, 17, 19 and 21, Breimesser, et al. is cited by the Examiner. Breimesser, et al. use multiplexing in a probe 2. The de-multiplexing is in a base unit 4. A 2D array is used, so the channel count is to be reduced for sending the signals over the cable to the base unit. There is no suggestion to position a summer (claim 6), a partial beamformer (claims 7 and 19), a digital processor (claims 8 and 15), an analog bypass switch (claim 9), a demux (claims 10 and 13), a serializer (claim 14), or a ADC (claims 17 and 21) in the probe assembly or between the transducer and releasable connector. These circuits work with different arrays, so would have been positioned in the base unit (system), not in the probe assembly, to reduce costs and complexity.

Figure 4A of Wright, et al. does not change this. Wright, et al. do not disclose a connector, so Fig. 4A does not teach placement of the connector. The connector would have been placed before the circuits as taught by Bunce. As an example, in the commercial system (Sequoia) corresponding to Wright, et al., the connector is before the circuits of Fig. 4A.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

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